

## POTENTILLA ROBBINSIANA IN THE WHITE MOUNTAINS OF NEW HAMPSHIRE

Of the distinctive alpine flora of the higher mountains of New Hampshire, *Potentilla Robbinsiana* Oakes is probably the most interesting species. It is the only alpine plant endemic to New Hampshire, and is rare in that state. Most other alpine plants occur on Mt. Katahdin in Maine and also in the arctic. An exception is *Geum Peckii* Pursh, which, although common in alpine regions of New Hampshire and occasional on wet lowland rocks, is known nowhere outside the state except for Brier Island, Nova Scotia.

*Potentilla Robbinsiana* has been known in the Presidential Range since 1863. It occurs on a small, stony, terraced area near the base of Mt. Monroe. It is represented from this station in a number of herbaria. The tabulation follows: Gray Herbarium, twenty sheets; New England Botanical Club, seven (one erroneously labeled as from Tuckerman Ravine); Jesup Herbarium, five; Pringle Herbarium, eight; University of New Hampshire Herbarium, two. Most of the sheets contain a number of plants, and the usual collecting procedure was to uproot the plant. The original Crawford Bridle Path went through the middle of the station; the present foot path goes to the south of it. In spite of heavy collecting and probable former damage from horses, the colony seems to be holding its own. The plants are small and inconspicuous, but during the flowering season it is easy to find a considerable number scattered throughout the area.

In Franconia Range, the situation is strikingly different. It was first collected from this range by Endicott in 1897 and from a different station by Fernald in 1915. The two stations are three quarters of a mile apart. Since 1915 there have been no collections, and surveys of the area by botanists and naturalists have led to the conclusion that both colonies were extinct. In 1961 and 1963, I made extensive searches of the areas where the colonies were indicated to occur. The 1961 search, concentrated on the



north colony, disclosed nothing, but in 1963, in company with Dr. Harry McDade, an able naturalist of Littleton, N. H., I relocated the southern colony. Only two clumps of the plants were observed, one about three inches in diameter and consisting of sixty plants, the other about one inch in diameter and consisting of six plants. An exhaustive search of the small area suitable for the species revealed no other plants, and, as this was the height of the flowering season, it seems unlikely that any were overlooked.

It is clear that the situation in the Presidentials is markedly different from that in the Franconias. In the former range, the plant is flourishing and perhaps expanding; in the latter, it is on the verge of extinction. There are two possible explanations of this situation.

First, although the alpine area of the Franconia Range is quite large, there are very few suitable sites for *Potentilla*. It evidently can not stand competition with other plants and grows either on bare gravel or in crevices in rocks on decaying mosses. The gravels in the Franconias are apparently of recent origin, unstable, and subject to erosion. Some apparently suitable gravels are near enough to the trail so that they suffer damage from hikers. The clumps of decaying mosses are infrequent, and the chances of a seed reaching them must be small.

Another adverse factor is undoubtedly overzealous collecting by botanists. The attitude of many of the early collectors is well summed up by Joseph Churchill (1901) in writing of the collecting of *Saxifraga stellaris* L. var. *comosa* Poir., a plant now close to extinction on Mt. Katahdin: "Now we all knew that somewhere near the summit 'on wet rocks' there had been collected by Scribner in 1873 *Saxifraga stellaris* var. *comosa* . . . . And to Williams is due the credit of first finding her, and of tearing her ruthlessly from her damp bed under the dark rocks. Being thus advised, however, the others soon found victims in similar unwholesome retreats and though the supply was limited, our Club and private herbaria at least will have a satisfactory representation of the rarity." The standard



method of collecting *Potentilla* was to uproot it. This probably was the cause of the extirpation of one of the Franconia stations.

The origin of this plant is an interesting puzzle. With two exceptions, all members of the alpine flora of the White Mountains also occur in the Arctic. Presumably, they were part of a widespread pre-Pleistocene Arctic flora, and migrated southward during the glaciations. *Potentilla*, the only New Hampshire endemic, may have had a different origin; at least there is no evidence that it was part of a pre-Pleistocene flora. Fernald, in Gray's Manual, in his description of the plant, states, "anomalous species with some characters of one series but with style of another." Polyploidy and apomixis are known to be common in the genus. Stebbins (1950) points out the close relationship between hybridization, apomixis and polyploidy, these processes forming what he designates as an agamic complex. He also states that agamic complexes are particularly well adapted to colonizing new, unstable environments, such as those that have been subject to glaciation. Thus, there is a possibility that *Potentilla Robbinsiana* is an apomictic polyploid of hybrid origin.

To investigate this possibility, cytological studies and emasculation experiments would be necessary. It obviously would be undesirable to remove any *Potentilla* from the Mt. Monroe station. Furthermore, regulations of the White Mountain National Forest prohibit this. There is, however, good evidence that the plant spreads readily by seeds, since it is still flourishing at this station in spite of 100 years of collecting. Thus, a suitable procedure for a botanist wishing to investigate the problem would be to collect seeds and grow them in some lowland station. The same procedure might well be followed in the case of other rare species. Over-collecting by some of the early botanists has apparently destroyed stations of certain rare plants. Contemporary botanists certainly would not wish to follow their example.



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STEBBINS, G. L., JR. 1950. *Variation and Evolution in Plants*, Columbia University Press, New York.

A FLORA OF NORTHERN NEW HAMPSHIRE<sup>1</sup>

This is a thoroughly revised and enlarged edition of the Vascular Flora of Coos County, N. H., published in 1924. However, there are so many additions to the flora, changes in classification, revised statistics, and so much new material in the introduction, that this, in the words of the author, should be regarded as "essentially a new work." Professor Pease died before the actual publication, although he had completed the manuscript. The retyping, editing, index, and proofreading were done by Dr. Stuart K. Harris and Mr. Ralph C. Bean. Without their many hours of painstaking labor, the publication of the work in its excellent form would not have been possible.

A total of 1689 species, varieties and forms are treated, the nomenclature following the eighth edition of Gray's Manual. The bulk of the work consists of citations of these taxa from representative localities in the county. In the case of the common species, citations are made from 10 to 20 of the 43 townships and grants of which the county is composed; for rare species all localities are cited. Thus, the work gives an excellent presentation of the distribution of the plants, especially inasmuch as information on habitat and state of abundance are included. The citations in all except a very few cases are supported by specimens, principally in the herbarium of the New England Botanical Club, but to a lesser extent in the Gray Herbarium, the Herbarium

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<sup>1</sup>A Flora of Northern New Hampshire by Arthur Stanley Pease, New England Botanical Club, Cambridge, Mass. 278 pages + 2 maps and index, 1964. \$4.00